

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Study of strain-mediated couplings in SrRuO₃-CoFe₂O₄ nanocomposite by Raman spectroscopy YI-CHUN CHEN, CHIA-HSIEN CHIEN, YEN-CHIN HUANG, Department of Physics, National Cheng Kung University, HENG-JUI LIU, YING-HAO CHU, Department of Materials Science and Engineering, National Chiao Tung University — Self-assembled vertical nanostructures have the advantage of high interface-to-volume ratio and can be used to generate new functionalities by the choice of combination of constituents. Recently, we found an interesting behavior of photo-induced magnetization switching in a self-assembled system, CoFe₂O₄ (CFO) nanopillars embedded in SrRuO₃(SRO) matrix. In this study, to further reveal the coupling mechanism of this hetero-structure, we used Raman spectroscopy to investigate their phonons under external stimulus. When an external out-of-plane magnetic field is applied, the CFO A_{1g} phonon (688 cm⁻¹) had a red shift due to the negative magnetostriction effect, while the SRO A_g phonon (183 cm⁻¹) also had a correspondent red shift. This result indicates the crystal structures of SRO matrix are affected by the deformation of the CFO pillars through the magnetostrictive couplings. Moreover, at the phase transition temperature of SRO (160 K), three phonons (T_{2u}, E_g, E_u) of CFO also had a significant blue shift, which reveals again the strain-mediated coupling.

Yi-Chun Chen
Department of Physics, National Cheng Kung University

Date submitted: 14 Nov 2013

Electronic form version 1.4